

Notice of Allowability

Application No.

10/825,418

Examiner

Hoan H. Tran

Applicant(s)

IKEGUCHI ET AL.

Art Unit

2852

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to _____.
2. ☒ The allowed claim(s) is/are 1-27.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 8/27/2004
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 08/27/2004 has been considered by the examiner.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Allowable Subject Matter

3. Claims 1-27 are allowed.
4. The following is a statement of reasons for the indication of allowable subject matter:

Claims 1-7

None of the prior art of record teaches or suggests a developing device comprising a developer carrying unit including a rotatable non-magnetic sleeve and a magnetic field generating unit configured to have an amount of weakly charged toner in the two-component developer passing through the opening per unit time not greater than 200 g.mm/min; wherein the amount of weakly charged toner is expressed by an equation

the amount of weakly charged toner [g.mm/min] = total amount of the two-component developer to be drawn [g/min] X length of the opening [mm] X a concentration of toner [wt%] X percentage of weakly charged toner [%]

Art Unit: 2852

wherein the total amount of the two-component developer to be drawn is expressed by an equation

the total amount of the two-component developer to be drawn [g/min] = an amount of the two-component developer to be drawn [g/mm²] X drawing width [mm] X linear velocity of the developing roller [mm/min]

and the percentage of the weakly charged toner [%] is a percentage of toner having a charge of not less than $-0.1\text{fC}/\mu\text{m}$ if the toner is negatively charged, and is a percentage of toner having a charge not greater than $0.1\text{fC}/\mu\text{m}$ if the toner is positively charged, according to a distribution of charge per particle size.

Claim 8

None of the prior art of record teaches or suggests a process cartridge comprising a developing device having a developer carrying unit including a rotatable non-magnetic sleeve and a magnetic field generating unit configured to have an amount of weakly charged toner in the two-component developer passing through the opening per unit time not greater than 200 g.mm/min; wherein the amount of weakly charged toner is expressed by an equation

the amount of weakly charged toner [g.mm/min] = total amount of the two-component developer to be drawn [g/min] X length of the opening [mm] X a concentration of toner [wt%] X percentage of weakly charged toner [%]

wherein the total amount of the two-component developer to be drawn is expressed by an equation

Art Unit: 2852

the total amount of the two-component developer to be drawn $[\text{g}/\text{min}] = \text{an amount of the two-component developer to be drawn } [\text{g}/\text{mm}^2] \times \text{drawing width } [\text{mm}] \times \text{linear velocity of the developing roller } [\text{mm}/\text{min}]$

and the percentage of the weakly charged toner [%] is a percentage of toner having a charge of not less than $-0.1 \text{ fC}/\mu\text{m}$ if the toner is negatively charged, and is a percentage of toner having a charge not greater than $0.1 \text{ fC}/\mu\text{m}$ if the toner is positively charged, according to a distribution of charge per particle size.

Claims 9-16

None of the prior art of record teaches or suggests an image forming apparatus comprising a toner-amount adjusting unit configured to adjust an amount of toner to be adhered on the toner carrier before the surface conveyor of the developing device conveys the toner to the developing region such that in the developing region a total charge on the toner adhered on the toner carrier is not greater than a total charge on the toner carrier.

Claim 17

None of the prior art of record teaches or suggests a process cartridge comprising a toner-amount adjusting unit configured to adjust an amount of toner to be adhered on the toner carrier before the surface conveyor of the developing device conveys the toner to the developing region such that in the developing region a total charge on the toner adhered on the toner carrier is not greater than a total charge on the toner carrier.

Claims 18-23 and 26

None of the prior art of record teaches or suggests a developing device comprising a developer carrying unit configured to carry as a magnetic brush a two-component developer

Art Unit: 2852

including toner and a carrier with a magnetic field generating unit and supply the toner to a latent image on the latent image carrying unit in a developing region opposite to the latent image carrying unit; wherein a proportion of the toner satisfying equations

$$\mu Fq < F_{dmax}$$

$$Fq = (k/4\pi\epsilon_0) (q/r)^2$$

$$F_{dmax} = 4/3 \pi \cdot r^3 \cdot \sigma \cdot a$$

is not greater than 10%; wherein Fq is an electrostatic adherence of the toner with respect to the carrier in the two-component developer, F_{dmax} is a maximum inertial force exerted on the toner at the opening, μ is a coefficient of kinetic friction, π is pi, ϵ_0 is a dielectric constant in vacuum [F/m], k is a constant, q is an electric charge on toner particles [C], r is a radius of the tone particles [m], σ is a density [kg/m²], and a is a change in velocity of the magnetic brush [m/s²].

Claims 24, 25 and 27

None of the prior art of record teaches or suggests a process cartridge comprising a developing device including a developer carrying unit configured to carry as a magnetic brush a two-component developer including toner and a carrier with a magnetic field generating unit and supply the toner to a latent image on the latent image carrying unit in a developing region opposite to the latent image carrying unit; wherein a proportion of the toner satisfying equations

$$\mu Fq < F_{dmax}$$

$$Fq = (k/4\pi\epsilon_0) (q/r)^2$$

$$F_{dmax} = 4/3 \pi \cdot r^3 \cdot \sigma \cdot a$$

is not greater than 10%; wherein F_q is an electrostatic adherence of the toner with respect to the carrier in the two-component developer, F_{dmax} is a maximum inertial force exerted on the toner at the opening, μ is a coefficient of kinetic friction, π is pi, ϵ_0 is a dielectric constant in vacuum [F/m], k is a constant, q is an electric charge on toner particles [C], r is a radius of the tone particles [m], σ is a density [kg/m^2], and a is a change in velocity of the magnetic brush [m/s^2].

Prior Art

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- Hashimoto et al. [6,465,144] disclose a process cartridge.
- Shin et al. [5,689,784] disclose a non-contacting, non-magnetic, mono-component developing device.
- Iwata [5,241, 357] discloses a color image forming apparatus having two developers.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoan H. Tran whose telephone number is (571) 272-2141. The examiner can normally be reached from 8:30 AM - 5:00 PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Arthur Grimley can be reached at (571) 272-2136. The central office fax number for the organization where this application or proceeding is assigned is (703) 872-9306.

Art Unit: 2852

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

HHT

September 29, 2005



HOAN TRAN
PRIMARY EXAMINER